

REMARKS

This application has been amended in a manner believed to place it in condition for allowance at the time of the next Official Action.

Claims 1-16 are pending. Claim 16 is new. Support for claim 16 may be found generally throughout the specification, and particularly at page 6, lines 1-4 and page 12, lines 8-15.

The Official Action rejected claims 1-15 under 35 USC §112, second paragraph, as being indefinite. Applicant respectfully disagrees.

Claims 1 and 13 were rejected for reciting "at most 0.7 μm " and "at least 90 vol%". According to MPEP §2173.05(c), open-ended numerical ranges, such as "at most" or "at least" are not necessarily indefinite. Indeed, "The test of definiteness is whether one skilled in the art would understand the scope of the claims when read in the light of the specification." *Bausch & Lomb Inc. v. Alcon Labs. Inc.*, (DCWDNY 1999) 64 F. Supp. 2d 233, 52 PQ2d 1385.

As to the present application , one skilled in that art would have understood the term "at least 90 vol%" in light of the present specification to include an upper limit of 100vol%. Likewise, one skilled in that art would have understood the term "at most 0.7 μm " includes a particle diameter greater than 0 up to and including 0.7 μm .

Claims 9-12 were rejected for reciting the term "thickener". However, the term "thickener" also would have been understood by one skilled in art. The specification discloses the function of the thickeners in the present invention (i.e. at page 12, lines 8-15) as well as examples of thickeners (i.e. at page 12, line 26 to page 13, line 4).

Claims 5-15 were rejected for reciting the term "cosmetic ingredient". Cosmetic ingredients are mentioned at page 9, line 27 to page 10, line 2 of the present specification. Furthermore, possible cosmetic products obtained with the recited pigment dispersion at page 12, lines 17-21.

In view of the above, applicant believes that these terms would have been understood by one of ordinary skill in the art in light of the present specification.

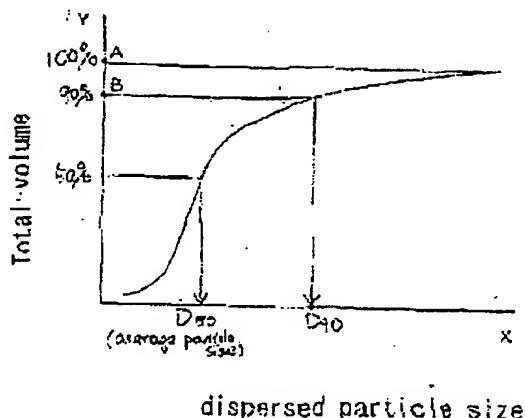
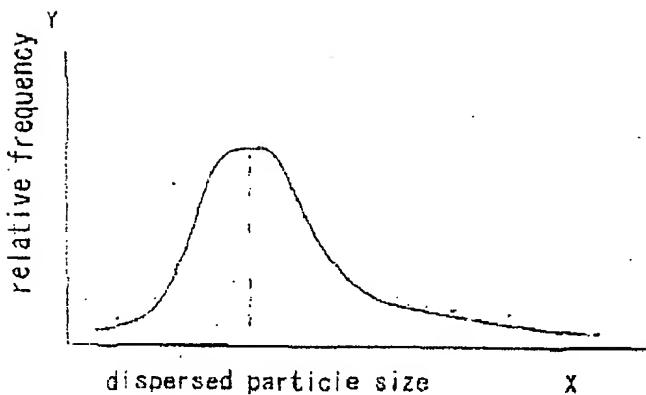
Therefore, applicant respectfully requests that the indefiniteness rejection of claims 1-15 be withdrawn.

Prior to discussing the publications cited in the Official Action, applicant believes that it would be helpful to explain how one determines a 90 vol% diameter, and what the recited feature of "at least 90 vol%" means relative to the present invention.

The method of determining the 90 vol% diameter is as follows. The relative frequencies of dispersed particles falling within the respective particle size ranges are plotted against particle size to give a histogram like the left graph shown

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below, namely, the particle size distribution chart. Then, the volume of particles having particle sizes within each particle size range is calculated from the frequency and the dispersed particle size within each particle size range in the chart. The total volume of particles having particle sizes below each particle size range is plotted against particle size to give an accumulative curve like the right graph shown below. Taking the total volume of all the particles as 100% (point A), D₉₀ is defined as the particle size at which the accumulative curve reaches 90% of the total volume (point B).



Thus, as shown by total volume curve above, the recited "at least 90 vol% diameter of at most 0.7 μm " means that not less than 90 vol% of the particles have a diameter at most 0.7 μm , and that there are not more than 10 vol% of the particles having a diameter of more than 0.7 μm .

The behavior and the manifestation of function as a colorant of a particle have a relation to its size, but the

particles such as pigment particles having a nanometer (nm) order size do not have a uniform size, rather a distribution in size.

As an index of behavior and function of particles, the average particle size has been typically used. However, two groups of particles having the same average particle size do not always exhibit the same properties. While the average size may be the same, the actual distribution of particles sizes within each group may be different. It is this difference in distribution of sizes that may result in different properties for each group.

Applicant has determined that, in this realm of particles such as pigment particles, a distribution of 90 vol% diameter is an effective index to control the functional capability of a pigment dispersion. It is surmised that the particles bigger than 90 vol% size, namely, coarse particles, cause flocculation and precipitation upon passage of time. The pigment dispersion of the present invention having the 90 vol% diameter of not more than 0.7 μm exhibits satisfying quality in the properties such as the average particle size at room temperature and at 50°C, pH, viscosity, particle size distribution, and precipitation.

The Official Action rejected claims 1-2, 5-6, 9-10, 13 and 14 under 35 USC §102(b) as being anticipated by SER et al. 5,580,546 ("SER"). Applicant respectfully disagrees.

As acknowledged in the Official Action, SER discloses that the "average size of the particles is between 0.03 and 0.5 μm (column 6, lines 16-17). However, it is not clear as to what this expression actually represents. For example, it is not clear if the "average" range refers to a single composition measured a plurality of times, or if this is an average of multiple compositions.

Also, it is unclear as to which "particles" were measured. It is mentioned nowhere that the "pigment particles" were measured.

Further, even if one were to assume that the diameter of "pigment particles" was measured, there are different types of pigment particle diameters, namely, the "primary particle size" and the "dispersed size in a dispersion medium". These two types of diameters are completely different.

Pigments are usually in a form of agglomerate of a number of primary particles. It is impossible to isolate each primary particle in a medium, and it is not very easy to disperse finely a pigment in a medium. The primary particle size is usually obtained by the electron microscopic method using electron microscopic picture, measuring the particles in static state. On the other hand, the dispersed particle size is usually obtained by methods such as laser diffraction scattering method, centrifugal sedimentation light transmittance method or photon correlation method, measuring the particles in motion like

Brownian motion or in sedimentation, and the size is obtained by converting the moving distance, sedimentation velocity, intensity of light from the particles, etc. Thus, the dispersed particle size is much bigger than that of primary particles.

Although the particle size varies widely, for instance, the particles with primary particle size of from 0.02 to 0.05 μm , without adequate dispersing process, would have a dispersed particle size exceeding 1 μm or more. Even with an ordinary dispersing process, the dispersed particle size would be about from 0.05 to 0.15 μm for instance.

Accordingly, as these two types of pigment particle diameters are completely different and SER does not disclose which type is used, SER does not disclose pigment particle sizes of a dispersion with any specificity.

Moreover, dispersions having the same dispersed average particle size but different distribution and therefore different 90 vol% diameter may be obtained according to the conditions of dispersing process, it is even more difficult to determine the 90 vol% diameter based on the description of SER.

Thus, as SER fails to disclose the meaning of "average" (i.e. of multiple measurements from a single composition or from multiple compositions), the type of "particles" measured (i.e. particles in a dispersion), and the size distribution that contributed to the "average" values with sufficient specificity

for the holding of anticipation, SER does not anticipate the claims.

Therefore, applicant respectfully requests that the anticipation rejection be withdrawn.

SER would also fail to render obvious the claims.

Notwithstanding the fact that SER fails to disclose the meaning of "average size" or to which particle size type it refers, SER fails to provide any motivation for selecting at least 90vol% of pigment particles with a dispersed diameter of at most 0.7 μ m.

Claims 1-15 were rejected under 35 USC §102(b) as being anticipated by HALL-GOULLE et al. 6,001,168 ("GOULLE"). Applicant respectfully disagrees.

The Official Action states that GOULLE discloses an "average particle size of less than 0.5 μ m (columns 12-13; claim 1; column 3, lines 32-45)". However, applicant could not find such a particle size.

Indeed, GOULLE relates to an invention on a pigment dispersion, and discloses a pigment dispersion with an "average" particle size range determined by the Joyce Loebel disk centrifuging method. GOULLE does not disclose whether the "average" size is within a single composition or for multiple compositions, and GOULE does not disclose anything about the dispersed diameter of at least 90 vol% of the pigment particles.

GOULLE discloses salt kneading of the pigment (of which the formula is disclosed at column 1, line 6) compound (columns

11-12, Examples 1-3), preparing concentrates (column 12, Examples 4 and 5), and preparing ink (column 12, Example 6). Specifically, GOULLE discloses that diacetone alcohol and common salt is added to the pigment compound I, and the mixture is kneaded in a Z-blade kneader at 60 degrees for 12 hours, then filtered off a Buchner funnel, and the residue is washed and dried at 80 degrees (Example 1 - basically similar processes in Examples 2 and 3). The filter cake are admixed with a solution of styrene-acrylic resin, water and isopropanol, and the mixture is ground in a ball mill for 24 hours with glass beads having a diameter of 2 mm, then sieved and the desired concentrate is isolated as eluate (Example 4 - basically similar process in Example 5). The concentrate is admixed with a styrene-acrylic resin and diethylene glycol, etc., mixed for 5 minutes in an Ultrarurax and then centrifuged, decanted and inserted as ink into an inkjet printer. Even taken as a whole, the description fails to disclose the recited dispersed diameter of at least 90 vol% of the pigment particles.

Thus, as GOULLE fails to disclose a pigment dispersion with at least 90 vol% of the pigment particles having a dispersed diameter of at most 0.7 μm as recited in the claims of the present invention, GOULLE does not anticipate the claims.

Therefore, applicant respectfully requests that the anticipation rejection be withdrawn.

GOULLE would also fail to render obvious the claims. As GOULLE fails to suggest any pigment particle size distribution curve, or even provide any motivation for selecting at least 90vol% of pigment particles with a dispersed diameter of at most 0.7 μ m.

In view of the above, applicant believes that the present application is in condition for allowance at the time of the next Official Action. Allowance and passage to issue on that basis is respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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